



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,116	09/24/2003	Richard Schiek	SD-7173	7257
20567	7590	10/26/2005	EXAMINER	
SANDIA CORPORATION P O BOX 5800 MS-0161 ALBUQUERQUE, NM 87185-0161			LIN, SUN J	
			ART UNIT	PAPER NUMBER
			2825	

DATE MAILED: 10/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/671,116

Applicant(s)

SCHIEK, RICHARD

Examiner

Sun J. Lin

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09/24/2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>09/24/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to application 10/161,116 filed on 09/24/2003. Claims 1 – 32 remain pending in the application.

Claim Objections

2. Claims listed below are objected to because of the following informalities:

Claim 1, line 7, change “the cross section” to **—a cross section—**.

Claim 1, line 9, before “process” insert **—description of—**.

Claim 1, line 10, delete **—description—**.

Claim 2, line 3, change “bodies” to **—body—**.

Claim 3, line 2, change “bodies” to **—body—**.

Claim 3, line 2, before “unique” insert **—the—**.

Claim 3, line 3, before “cross” insert **—unique—**.

Claim 4, line 2, change “model bodies” to **—body—**.

Claim 5, line 2, before “candidate” insert **—the—**.

Claim 6, line 4, before “node” insert **—topology graph—**.

Claim 9, line 4, change “the individual” to **—individual of the one or more—**.

Claim 9, line 8, change “the individual” to **—individual of the one or more—**.

Claim 9, line 10 before “masks” insert **—the candidate—**.

Claim 11, line 2, change “the individual” to **—individual of the one or more—**.

Claim 13, line 2, change “ a three-dimensional” to **—the three-dimensional—**.

Claim 13, line 2, change “the device” to **—a device—**.

Claim 13, line 2, change “the model” to **—a model—**.

Claim 16, line 2, change “the target process” to **—a target process—**.

Claim 16, line 2 (2 places), change “the divided” to **—a divided—**.

Claim 17, line 1, change “order of candidate” to **—order of the candidate—**.

Claim 17, line 2, change “the rearrangement” to **—an arrangement—**.

Claim 18, line 6, before “nodes” insert **—one or more—**.

Claim 18, line 7, change “the individual” to **—individual of the one or more—**.

Claim 18, line 8, change “the node” to **—the individual of the one or more nodes—**.

Claim 18, line 9, change “the node” to **—the individual of the one or more nodes—**.

Art Unit: 2825

Claim 18, line 10, change "the individual branches" to **—individual of the one or more branches—**.

Claim 19, line 3, change "the individual" to **—individual of the—**.

Claim 21, line 2, change "individual" **—the individual of one or more—**.

Claim 22, line 12, change "the cross section" to **—a cross section—**.

Claim 22, line 14, before "process" insert **—description of—**.

Claim 22, line 14, delete **—description—**.

Claim 23, line 3, change "bodies" to **—body—**.

Claim 23, line 5, change "bodies" to **—body—**.

Claim 24, line 3, change "bodies" to **—body—**.

Claim 24, line 5, change "bodies" to **—body—**.

Claim 24, line 6, before "candidate" insert **—the—**.

Claim 25, line 3, change "bodies" to **—body—**.

Claim 25, line 5, change "bodies" to **—body—**.

Claim 25, line 10, before "node" insert **—topology graph—**.

Claim 27, line 8, change "the individual" to **—individual of the one or more—**.

Claim 27, line 16, change "the individual" to **—individual of the one or more—**.

Claim 28, line 3, change "the individual" to **—individual of the one or more—**.

Claim 30, line 11, before "nodes" insert **—one or more—**.

Claim 30, line 12, change "the individual" to **—individual of the one or more—**.

Claim 30, line 15, change "the node" to **—the individual of the one or more nodes—**.

Claim 30, line 16, change "the node" to **—the individual of the one or more nodes—**.

Claim 30, line 18, change "the individual branches" to **—individual of the one or more branches—**.

Claim 31, line 4, change "the individual" to **—individual of the—**.

Claim 31, line 11, change "individual" **—the individual of one or more—**.

Claim 32, line 8 – 9, change "the cross section" to **—a cross section—**.

Claim 32, line 10, before "process" insert **—description of—**.

Claim 32, line 11, delete **—description—**.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1 – 32 are rejected under 35 U.S.C. 102(a) as being unpatentable over IDS paper entitled “A New, Topology Driven Method for Automatic Mask Generation from Three-Dimensional Models” authored by R. Schiek and R. Schmidt (called Schiek & Schmidt hereinafter)

5. As to Claim 1, Schiek & Schmidt show and teach the following subject matter:

- A method of generating two-dimensional (2D) masks from a three-dimensional (3D) model – [title; abstract];
- Providing a 3D model represent a MEMS (micro-electro-mechanical structure) for manufacture and a description of process mask requirements – [abstract];
- Reducing the 3D model to a topological description of unique cross sections – [Section 3];
- Selecting candidate masks from the unique cross sections and a cross section topology – [Section 3.2; Section 4];
- Reconciling the candidate masks based on the description of process mask requirements to produce 2D process masks – [Section 3.2; Section 4].

For reference purposes, the explanations given above in response to Claim 1 are called [Response A] hereinafter.

6. As to Claims 22 and 32, reasons are included in [Response A] given above.

7. As to Claims 2 and 3, in addition to reasons included in [Response A] given above, Schiek & Schmidt disclose the following subject matter:

- dividing (i.e., separating) a 3D model into many non-intersecting (model) bodies (i.e., independent model bodies) – [Section 4];

- Generate a topology tree for each of non-intersection (model) bodies (independent model bodies) – [Section 4];
- Locating (i.e., searching) candidate non-overlapping masks for unique cross sections in the topology tree – [Section 4];
- Summation of all candidate masks – [Section 4]; Notice that the summation is achieved by arranging the unique cross sections based on mutual topological relationship.

For reference purposes, the explanations given above in response to Claims 2 and 3 are called [Response A1] hereinafter.

8. As to Claim 4, Schiek & Schmidt teach conduction of a simplification of topology trees by combining nodes that topologically connect into one node, thereby reducing number of nodes in topology trees (i.e., topology graphs) – [Section 4].

For reference purposes, the explanations given above in response to Claim 4 are called [Response A2] hereinafter.

9. As to Claim 5, Schiek & Schmidt teach subject matter regarding selecting candidate masks based on topology trees (i.e., topology graphs) – [Section 3.2].

For reference purposes, the explanations given above in response to Claim 5 are called [Response A3] hereinafter

10. As to Claim 6, Schiek & Schmidt teach subject matter in [Section 3; Section 3.1; Table 1].

For reference purposes, the explanations given above in response to Claim 6 are called [Response A4] hereinafter.

11. As to Claim 7, Schiek & Schmidt disclose subject matter regarding summing the candidate masks and reconciling the summed candidate masks comprising performing selected operations based on process constraints on splitting the summed candidate masks – [Section 3.2; Section 4].

For reference purposes, the explanations given above in response to Claim 7 are called [Response A5] hereinafter.

12. As to Claim 8, Schiek & Schmidt disclose that the process constraints are selected from specific material type of a layer – [Section 3.2].

13. As to Claim 9, Schiek & Schmidt disclose the following subject matter:

- A method of generating two-dimensional (2D) masks from a three-dimensional (3D) model – [title; abstract];
- Disassembling the 3D model into one or more non-intersecting bodies (i.e., independent bodies) – [Section 4]
- Processing for each non-intersecting body (independent body): generating a topology tree composed one or more nodes, categorizing the one or more nodes of the topology tree, and locating deposition boundaries – [Section 4];
- Processing for each deposition domain: locating candidate masks, and saving the candidate masks in a candidate mask set – [Section 4];
- Summing all candidate masks in the candidate mask set – [Section 4].

For reference purposes, the explanations given above in response to Claim 9 are called [Response B] hereinafter.

14. As to Claim 27, reasons are included in [Response B] given above.

15. As to Claim 10, Schiek & Schmidt disclose the subject matter regarding providing the 3D model that represents a MEMS device in [abstract]

16. As to Claims 11 and 28, Schiek & Schmidt disclose the subject matter regarding combining redundant nodes – [Section 4].

17. As to Claim 12, Schiek & Schmidt disclose the subject matter regarding adjustment the candidate masks can be done with a stepwise optimization sequence of process steps that are capable of producing a model that cannot be produced within a constraints of a specified process – [Section 3.2].

18. As to Claim 13, Schiek & Schmidt teach that "*Specific process details do not enter the algorithm until the final step. Allow most of the algorithm to operate independently of process details and keep the algorithm flexible to process changes*" – [Section 4].

19. As to Claims 14 and 29, Schiek & Schmidt teach the subject matter regarding reconciling the candidate masks in the candidate mask set with target process constraints – [Section 4].

20. As to Claim 15, Schiek & Schmidt teach the subject matter regarding reconciling the candidate masks comprises inverting etching senses of a candidate mask to meet a target process constraint – [Section 3.2].

21. As to Claim 16, Schiek & Schmidt show and teach the subject matter in Fig. 1.

22. As to Claim 17, Schiek & Schmidt teach the subject matter regarding reconciling the candidate masks comprises rearranging order of the candidate masks – [Section 3.2].

23. As to Claim 18, Schiek & Schmidt show and disclose the following subject matter:

- A method of generating two-dimensional (2D) masks from a three-dimensional (3D) model – [title; abstract];
- Analyzing cross sectional topology of a 3D body – [Section 3; Fig. 1];
- Generating a topology tree describing connectivity and relationships between cross sections, the topology tree including one or more nodes and branches – [Section 3; Section 4.2; Fig. 3];
- Processing individual node comprising: calculating a cross sectional area of the individual node, and categorizing the node relative to topological neighboring nodes – [Section 3; Section 3.1; Table 1];
- Processing individual branch comprising: locating depositing boundaries to define one or more deposition zones (i.e., domains) – [Section 3.1];
- Processing individual deposition domains between the deposition boundaries comprising: uniquely identifying (i.e., defining) special process masks (i.e., a mask set) and deposition thickness – [Section 3.1].

For reference purposes, the explanations given above in response to Claim 18 are called [Response C] hereinafter.

24. As to Claim 30, reasons are included in [Response C] given above.

25. As to Claims 19 and 20, Schiek & Schmidt disclose the subject matter in Section 4.

For reference purposes, the explanations given above in response to Claims 19 and 20 are called [Response C1] hereinafter.

26. As to Claim 21, Schiek & Schmidt teach conduction of a simplification of topology trees by combining (i.e., jointing) nodes that topologically connect into one node (i.e., redundant nodes), thereby reducing number of nodes in topology trees (i.e., topology graphs) – [Section 4].

For reference purposes, the explanations given above in response to Claim 21 are called [Response C2] hereinafter.

27. As to Claim 23, reasons are included in [Response A1] given above.

28. As to Claim 24, reasons are included in [Response A1], [Response A2] and [Response A3] given above.

29. As to Claim 25, reasons are included in [Response A1], [Response A2] and [Response A4] given above.

30. As to Claim 26, reasons are included in [Response A5] given above.

31. As to Claim 31, reasons are included in [Response C], [Response C1] and [Response C2] given above.

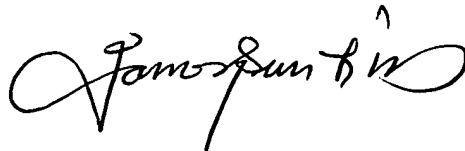
Conclusion

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sun J Lin whose telephone number is (571) 272 - 1899. The examiner can normally be reached on Monday-Friday 9:30AM - 6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S Smith can be reached on (571) 272 - 1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sun James Lin
Patent Examiner
Art Unit 2825
October 25, 2005

A handwritten signature in black ink, appearing to read "James Lin", with a stylized flourish at the end.